



COLORADO SPRINGS,
COLORADO

SEPTEMBER 1988

PIKES PEAK RADIO AMATEUR ASSOCIATION, INC.
P.O. Box 16521
Colorado Springs, CO 80935

FIRST CLASS MAIL



Ø BEAT



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ZERO BEAT is published monthly in the interest of the members of the Pikes Peak Radio Amateur Association, Inc., P.O. Box 16521, Colorado Springs, Colorado 80935. Cost is 50¢ per month for non-members or a \$4.00 per year subscription. Permission is given to reprint articles or excerpts provided credit is given. Deadline for submission of articles is the 21st of the month. Classifieds accepted anytime.

The Pikes Peak Radio Amateur Association meets on the second Wednesday of each month at Giuseppe's Depot Restaurant at 10 S. Sierra Madre at 7:30 p.m. All amateurs and interested parties are invited to attend.

Editor: Keith Goobie NYØT, 5335 Coneflower Ln., Colorado Springs, CO 80917 637-1525

NEW MEETING LOCATION

The September meeting of the PPRAA will be held at the Hewlett-Packard Briargate facility. The following instructions should ensure a smooth adjustment to this new meeting location.

1.) The HP Briargate facility is located at the intersection of Union Boulevard and Lexington Drive (diagonally across from Rampart Senior High School).

2.) Taking Woodmen Road east and turning north on Union Boul. is probably the best route for most people (otherwise pick your own route from the Briargate map).

3.) All PPRAA members must enter the HP Briargate facility through the main gate on Union Boul (see attached map). Please do not plan to arrive more than 30 minutes before the scheduled meeting time.

4.) All vehicles are stopped at the gate. Please state that, "attending the Radio Club meeting".

5.) After being waved through the gate, drive straight ahead to the visitor parking area (please do not drive into the other parking areas since doing so is likely to attract HP's security people).

6.) Note that the road to the visitor parking area is a one way road. When you leave use the exit road on the other side of the parking lot.

7.) Park your vehicle in any visitor or unmarked space.

8.) Proceed directly to the lobby, which is located on the west side of the building (the side closest to the visitor parking lot, again see map).

9.) Once inside, you'll be asked to find two stickers bearing your name. One sticker will be affixed to an HP name badge for you to wear. The second sticker will be placed in the log book at the lobby security desk. If you are a guest or not a member of PPRAA you will need to write your name in the log book and on a name badge. These methods are meant to speed up the sign in procedures for members, guests and the HP security people (most people will have stickers). Note that guests and non members are still welcome.

10.) Groups of members will then be escorted from the lobby to the meeting room (you may need to wait a few minutes in the lobby before being escorted to the room).

11.) Restrooms are located near the meeting room. Although you do not need to be escorted to the restrooms, please do not wander around the building during the breaks.

12.) If you are contacted by a security person, tell them you are "with the radio club meeting". They will either escort you back to the meeting or to the lobby and will contact one of the HP club members.

13.) When the meeting is over, members will be escorted back to the lobby. Please return your badge before leaving.

"THE VIEW FROM THE PEAK"

by George Hinds, N8CIX/Ø

WESTERN HOSPITALITY CAN BE STRETCHED MIGHTY THIN AT TIMES...

First it was a report of a mountain lion being struck by a car in Colorado Springs northeast side; a few days later a mountain lion and a pair of cubs were spotted on the east side of Woodland Park... then reports came daily from a local amateur southwest of Woodland Park who has been having an unwelcome visitor to his home. No, not a two-legged thief or vandal - a four-legged one! Seems like this black bear likes NØPCR's abode and began coming almost nightly to check the place out.

The first evening Bob was working in the garage and heard strange noises outside. Walking out the drive, there was a crashing noise going away from the area. Next night he found items around the house and garage disturbed - a step ladder overturned, claw marks on doors and a ripped window screen.

By this time Bob was telling us he was certain the intruder was a bear - that was proven true when, upon returning home about midnight the next evening, he opened his garage door to drive in and came face to face with the bear - who reared up on hind legs. Quite understandably, this action made an impression on Bob and some house guests in the car! Horn blowing finally sent Mr. Bruin away; looking around, Bob found the bear had pushed open a side door that had failed to latch earlier. Well, now we had something to talk about on the repeater - about how things were going over at "Bear Ranch".

A call to the Colorado wildlife department brought a ranger with a bear trap several days (and a few more bear visits) later. While Mr. Bruin missed a few nights at Bob's, the locals on the repeater were anxiously awaiting a resolution of the conflict between ham and beast.

And conflict it was: the next bear visit came while the family was away and resulted in the animal ripping two door screens and some windows, left claw marks on door and window casings and overturning everything loose outside of the garage and home.

We local hams up here were in a unique position - we sympathized with NØPCR but we were also kinda on the side of the bear, too. Perhaps old Bruin would just walk into the trap and be carted away to another locale.

But a mutually peaceful solution to the problem just wasn't to be: a couple of days later Bob checked in to report the warden calling to say a neighbor of Bob killed the old rascal... the bear, that is, not Bob! Well, the insurance company is relieved - Bob no longer peers into the darkness for Bruin when he comes in at night - but we hams have lost a topic of conversation that produced much speculation and banter on the 145.16 repeater. Wait! - If that bear had a male around???

FCC TAKES 220-222 MHZ FROM HAMS IN FAVOR OF FUTURE LAND MOBILE USE...

WHAT WILL BE NEXT?

The FCC has ruled against amateur radio and for commercial interests - principally United Parcel Service - and as soon as details are worked out for the new users (a year or maybe two) ham radio on 220-222 must cease. Short of a miracle happening it's another part of the ham radio spectrum lost to us...

It matters little where we lay the blame: politics, money power, insufficient use by hams, etc.

From my viewpoint, I think our defeat in favor of land mobile users came "through the back door" as a result of rejection by hams of all efforts to load 220 MHz with users through adopting some form of no-code, learner privileges program in ham radio. We succeeded admirably in what most felt was our noble pursuit of keeping away thousands of "hobby radio" folks from entering the doors of amateur radio - and, when the pressure for more spectrum by land mobile users became overwhelming, we had in effect defeated ourselves. Surely at the time we won the battle, but just as surely again we have lost the war!

Our concern in the immediate future should be to act quickly to populate other little-used ham frequency allocations: 420 & 440 in many areas of the country and 900 MHz and 1.2GHz for there is no usage there (surely you don't believe there are as many UHF repeaters on the air as are in directories?)

CONTINUED ON PAGE 7

COLORADO REPEATER ASSOCIATION

I was recently invited by Mike Barnell WDJFVV to visit the Colorado Repeater Association (CRA) repeater site during one of the associations routine maintenance visits to their site on top of Conifer Mountain, southwest of Denver. The CRA sponsors repeaters on 147.225 (+) Mhz (WDJFVV), 145.145 (-) Mhz (N0ESX), 224.980 (-) Mhz (WDJFVV) and 447.150 Mhz. The 147.225 and 224.980 systems are permanently hard-linked together and this has helped to encourage NOVICE activity in the Denver and surrounding areas.

After meeting with Mike WDJFVV, Dave WAIJHK, Doug N6GNS, Wes KE0UZ, Dave WDDWT, Glen WN0EHE, and Greg K0ELM at one of Denver's finest donut shops (with the usual loading up on coffee and donuts - the breakfast of champions), we all proceeded west into the mountains. After a short thirty minute drive through some winding mountain roads, we finally began our ascent up the last road to the site. The weather was excellent that day and the view from the site was fantastic. It was quite understandable why they had chosen this place for their repeater site.

After the convoy arrived, I was given a tour of the surrounding area, shown the impressive tower structure and then given a run-down on all the equipment used to support the four repeaters. On this particular trip the CRA maintenance crew was there to adjust the duplexer on the VHF sub-band repeater, perform some adjustments on the site controller and to install some additional grounding on the antenna structure to get rid of some intermittent noise that they were having. I took out my trusty camera and caught the crew in action performing their maintenance chores and also got a few pictures of the antenna structures.

I would like to take this opportunity to give you a run-down on the different repeater systems that they support at that site. From the high end of the bands that they support, there is the 447.150 Mhz system. It is a commercial package with its associated duplexer and it feeds a four bay antenna on top of a 100 ft tower. The antenna has its main pattern of coverage oriented towards

Denver and it has a simplex autopatch available for member use.

The next repeater is what most in the area refer to as the "sub-band" repeater. It operates on 145.145 Mhz under the call N0ESXR. It is a Spectrum Communications basic repeater package which had to be beefed up to enhance its selectivity (it being located beside another VHF system) - then a receiver pre-amp was added to increase the sensitivity. It runs about 15 watts and it feeds a four bay antenna at the 80 foot level.

Last but not least are the hard-linked repeaters on 147.225 and 224.980 Mhz. The two meter side is comprised of a commercial VHF mobile transceiver which for the most part was left intact because of the excellent shielding that it provided for the receiver and transmitter assemblies. For additional impact, a 100 watt power amplifier is used. The antenna system is a four bay omnidirectional array sitting at 100 feet. The two twenty side is a Kendecom repeater package with a WACOM duplexer and it feeds a four bay antenna at 80 feet.

This particular system supports a full duplex autopatch. The repeater site is not within local dialing of Denver, so a separate link had to be engineered to someone's residence that was within local dialing of Denver. This was accomplished by using another 220 link/repeater on the low end of that band (this will ultimately change with the new FCC decision). To integrate these three systems together, WAIJHK built an audio matrix and control system. It is constructed in such a way that if a signal appears on any of the three receivers, then all three transmitters are keyed up (this is why you sometimes hear two people talking at the same time on the system). The actual radio-wire integration (phone patch) is done at the QTH of WAIJHK in Parker, CO. There he has another 220 link/repeater setup that is interconnected with an S-Com controller which provides the interface to the phone line. All the beeps that you hear are generated from this controller which indicates call progress and termination.

It is due to the large membership within the CRA that they have able to develop/implement such an elaborate setup. Membership in the CRA costs \$15.00 a year which permits unlimited (?) use of the repeaters and grants use of the autopatch facilities.

What are the future plans of the CRA? Currently they are investigating the setup of another site to support other repeater system

on VHF and UHF. They currently have no plans to support packet digipeaters, but as the CRA grows or the desire is expressed by the membership, this may be considered.

After meeting with the members of the CRA repeater group, I have found them to be very dynamic and responsive to the user needs. They are certainly public oriented and this has helped them to become one of the largest and most popular amateur groups in the area.

Kath NYØT



The repeater shack for the CRA systems. The 224.98, 145.145 & 447.150 systems are on the left with the 147.225 machine controller on right.



The sky needles - @ 100 ft - 147.225 and 447.150 antennas - @ 80 ft - 224.980 and the 145.145 antennas.



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Basic Antennas

As I had promised you last month, Here we go on the basic antennas. Antennas A and B are just that, basic half wave antennas. Though very basic, they are the mainstay for low band operations, on 40, 75 and 160 meter operation.

You'll will note that I have not only drawn the antennas but, I have also taken the time to tell you, some other fact information.

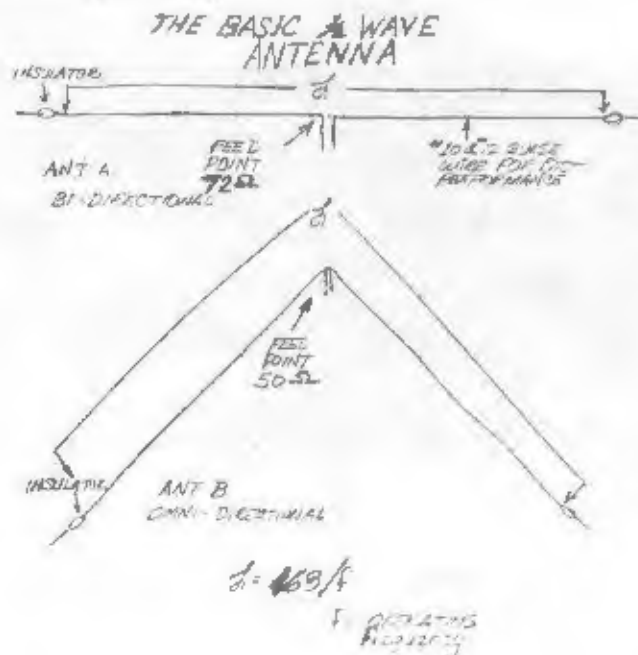
First of all ANT A and ANT B. The calculation for determining the length of the wire overall for the half wave antenna. The use of $\lambda = 468/f$, 468 precludes the worry of velocity factors, in coax or feed line systems. We are playing with very low frequencies and velocities are not truly important here. The most important thing is get the right length and then feed the antenna with the correct impedance feed line. With a matched impedance, the introduction of Standing waves, will be greatly reduced. The antenna can be said to be looked at, much like an inductor. Ergo the changing of the frequency is directly proportional to the inductive reactance. When the correct length of wire is matched to the frequency, the antenna circuit will then be resonate and we will have no standing waves. In short E will lead I by 90 degrees. So at the feed point I is maximum and at the end of the antenna E is maximum. As we change frequency the point of E moves, the circuit becomes untuned and there is an introduction of standing waves. If we use an improper feed line, our circuit becomes untuned and we introduce standing waves. For example. By feeding ANT A, with a 52 ohm coaxial cable, we introduce a 1.5 to 1 SWR, and that is the lowest we will ever get our SWR reading on a bridge. To keep the circuit tuned properly, we need to feed the antenna with a 75 ohm coaxial line, such as RG 11 or RG59. The same is true for our inverted vee, ANT B, it should be fed with RG8 or RG58 coaxial cable. We should also look to use a Balun to feed the antenna properly. Why? In truth the single wire half wave antenna is in fact an unbalanced line or circuit. The balun will take the balanced line feed such as RG 8 coax and balance the antenna to electrically make it look balanced to the coax,

thereby improving our chance to achieve a perfect 1 to 1 match at resonance

In example A we see the curve of an 75 meter antenna being feed with RG 8 coax and using a 1 to 1 balun, for a feed center. The antenna is made from common household #12 copper wire with the insulation still on the wire. This will not effect the operation of the antenna. It will lengthen the life of the antenna

The most common garden variety of antenna, is the "Inverted Vee" (ANT B) for use in the low frequency operation. The antenna can be strung up to a tree a tower, a push up mast or eve of a roof. It will perform with great ease. It gives the user omni-directional coverage and per cost, is pretty cheap. Now I have already shown you, that the typical user band width is about 150 Khz. Not to bad but, the voice portion, on 75, is a lot wider than that. How do I achieve a broader frequency coverage? There are two answers to that question. The simplest answer would be use an ordinary feed line to the antenna and NO balun. Then put a tuner on line. You can get it all that way but, as I have already mentioned in a earlier article a good tuner, can be more than \$260.00. That will raise an eyebrow on even the hardest of Hams. Novice Notwithstanding. In my next article I will go into the broadening of the antenna bandwidth, without a tuner. See you next month.

73's PAUL



THESE
SWR CURVES
FOR 75 METER
ANTENNA
FEED WITH
RG 8 COAX

The View From The Peak

Continued from Page 2

Perhaps more practical yet in hindsight would be to once again consider some "radical" means to encourage a "hobby class" ham ticket on unused bands. Land mobile users are multiplying like rabbits - and they're finding out how good their communications would be on unused, or little used, amateur bands, so the demand will not go away. The demand for spectrum is exploding. Should we continue to bury our heads in the sand and pretend it can't happen again - and again? Where will they strike next? It's something to think about, isn't it?

73, George N8CIX

NEW MEETING LOCATION

CONTINUED FROM PAGE 2

14) If you have any questions, please call Dave Ritchie N4DJS 531-0663 or Bruce Lundaby N6IZR 528-6667.

PPRAA MEETING SEPT. 14, 1988

Program:

**CRAY
SUPER
COMPUTERS**

By Doug Wheeland WB2KIT



AMATEUR RADIO LICENSE EXAMINATIONS

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NEW 3456 MHZ. RECORD SET

After two attempts, a new 3456 Mhz. record was set at 10:58 a.m. MDT on August 7th. The new record mileage was 454 miles between WB5AFY in Vernon, Texas and KX0O/Q located on Pikes Peak, Colorado.

Poor conditions were present on July 16th and August 6th. A contact was made on the third try of August 7th.

On July 16th, KX0O, NY0T and KD7O drove to the top of the 14,110 foot mountain. Conditions on the Colorado end were good, but the Texas side of the path was not favorable for a try at the record. However, KX0O was able to complete his 3456 Mhz. VUCC by working W0KJY, K0KE and K0RZ/mobile in three grid squares. K0RZ/mobile was running 1 watt and a 32" dish antenna and when working KX0O/Q, never dropped below S-9+20 at over 100 miles.

August 6th dawned with KX0O and KD7O on Pikes Peak operating on 432 Mhz., 903 Mhz. and 3456 Mhz. WB5AFY was copied with strong signals on 342 Mhz., but the attempt to establish contact on 3456 Mhz. garnered weak signals from WB5AFY, with no signals received from KX0O/Q. However KX0O/Q worked WB5LUA at McKinney, Texas on 902.1 Mhz. over a distance of 615.2 miles, only 6 miles shy of breaking the U.S. distance record on that band!

Another station worked on 903 Mhz. on the 6th of August was WA0TKJ at Salina, Kansas, a 390 mile shot. WA0TKJ was running a single 33 element loop Yagi and 20 watts. KX0O/Q was running 35 watts, also with a 33 element loop Yagi. Signals over the 390 mile path were 5-5-9 at times. It appears that 903 Mhz. is an excellent band with many character traits of 432 Mhz.

Then, on the 7th of August, WB5AFY and KX0O/Q were at it again. 432 Mhz. provided the liaison necessary to establish beam headings and propagation peaks. It was interesting to note that 3456 Mhz. propagation would peak after 432 would peak, an almost inverse relationship existed between signals on the two bands.

At 10:58 a.m. MDT calls, reports and rogers were exchanged with KX0O/Q peaking out of

the noise 8db. at WB5AFY and WB5AFY peaking 12 db out of the noise on the Colorado end of the path. Because of the use of higher power on the Texas end, WB5AFY was copied for almost 40 minutes before contact was finally made.

Equipment in use at the Texas station included a 6 ft. dish with a soup can feed, and 275 watts from a TWT amplifier. KX0O/Q was running a transverter with 1296 lf., 13.5 watts and a 32 inch dish with a soup can feed. Both receiving systems employed 1 db. noise figures.

It was noted on both ends of the path that signals would peak at approximately 5 minute intervals, and that the 3456 Mhz. signals experienced rapid QSB on both sides of the contact.

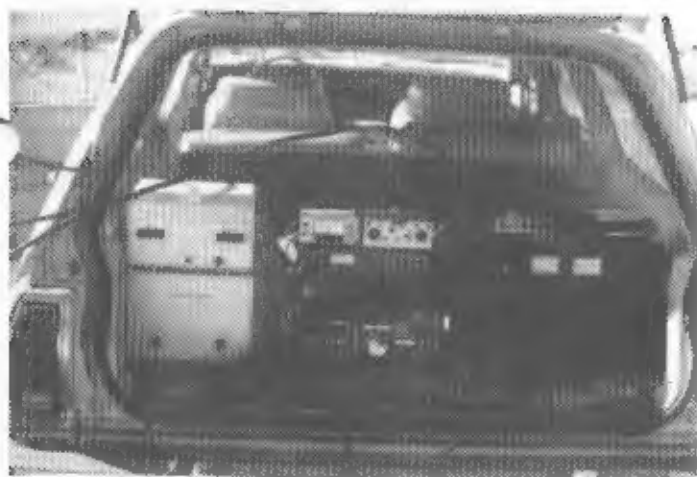
Conditions at the Colorado end of the contact saw temperatures in the high 40's on Pikes Peak, with humidity near 50%. Mid-path in the Texas panhandle was near 90°, with humidity near 60% and conditions at WB5AFY saw temperatures in the low 90's and humidity near 60%.

Many thanks are to be extended to KD7O, NY0T, K0RZ, KD0GT, W0MXY and NK0P for their valuable assistance in the project.

KX0O



Jim KD7O orients the yagis for 432 and 2304 along with the dish for 3456 Mhz for best reception.



The mobile shack of KX00/B.



Lauren is in his typical operating position, he brings chair, but never sits down.

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Contact George Beauchamp SR WD0K at telephone 635 - 8758 for details.

PICNIC PRIZE

The winner of the 220 HT was Frank - N0TEM.

N0CAM SETS RECORD

Membership in the N0CAM repeater association has just surpassed the 50 member mark. Congratulations are extended to that organization for the excellent facility that they maintain. N0CAM is on 147.345 Mhz (+) and features a full duplex autopatch. They also have a UHP repeater on 447.825 Mhz (-) but have plans to restore the 448.000 machine shortly.

ROCKET LAUNCH SUPPORT

Mike K0TER would like to thank the following people for the comm support and the tracking they did as well:

Participating at site was Ray AA0L, Malcolm KE9S, Lev K00NC, Jody KA8ROZ, Mike N0JLH, Renay KA8ROY, Jim N0AUY, and Charlene WB0YOB.

Participating in town was Wayne W0FPQ, Rick WB7THT, Doug N0HJT, and Ron NK0P.

We will hopefully have an article for next month's edition of the newsletter.

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MINUTES OF AUG GENERAL MEETING

submitted by Al N0CMM, secretary

The general meeting of the Pikes Peak Radio Amateur Association was held at Giuseppe's Old Depot Restaurant, Wednesday evening 10 Aug 1988. The meeting was called to order by the president Ron NK8P at 19:30, and followed by the introduction of members and guests.

The minutes of the previous General Meeting and Board meeting were approved as printed in Q-Beat.

Committee Reports

Note: Anyone wishing to help out on any of these committees, please contact the chairman at the phone number listed. Thank you for your support.

Treasurer - Bud N0DDF (599-7699):

Previous balance was \$2730.77, Income of \$0633.25, expenses of \$322.80, leaving a balance \$2441.22.

Interference - Ron NK8P (593-8352):

Nothing to report.

Education - Dave N4DJS (531-0663):

Tentative plans have been made to start a Novice class in September. Please contact Dave N4DJS 531-0663 or Bruce N0IZR 528-6667 for further info.

Publicity - Karen N1FED (495-0091):

Will be working with the Education Committee to publicize the upcoming Novice classes. Will be doing the same for the imminent move to the Hewlett-Packard facilities for the September meeting.

Colorado Council of Amateur Radio

Clubs (CCARC) - Oak K9ROL (591-1426):

The CCARC will meet in the Chapel Hills Mall on Sept 10, 1988 and all local members are encouraged to attend. The meeting room is near Joslins.

Deaf and Blind School - Jim WA9ABB (598-7543):

New classes will be starting the second week of September.

Q-Beat - Keith NY0T (637-1525):

Needed help for distribution of Q-Beats to Radio Shacks. Due to other activities, Bud N0DDF can no longer do this job (Thanks for all your help!). Faye KB0QI has volunteered to head up this job.

ARES - Mallory N0IKP (591-0049):

Nothing to report.

Public Service - Mike K0TER (636-1290):

Mike thanked all those who worked on the rocket launch. It was that an activity that was well done by all.

VE Testing - Max KD0EL (488-9289):

Max stated that the next VE Testing will be 20 Aug 88 at the 1st United Methodist church at St Vrain and Nevada.

Teller Hill - Doc W0MCT (596-4216):

There will be another call for volunteers for the same race in September (planned for the 24th and 25th).

Picnic - Jim WA9ABB (598-7543):

Picnic will be held on Sunday Aug 28 at Picnic Area #3 at the Air Force Academy. We will be the guests of the AFA Radio Club. Plan on having a mini-swapfest so bring along your old boat anchors in the hope that you may bring a little newer one! NOTE: The 220 Mhz Ht will be given away at this event.

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TAB BOOKS

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New Business

On an experimental basis, the next Club meeting will be held at the Hewlett-Packard (HP) facilities at the intersection of Union and Lexington, across from Rampart High School. Go north on Union and cross Lexington, it will be on the right. Report to the Security Desk, and maps will be passed out if you do not have one to get to the right place.

Marshall Quist AGØX, our ARRL Division Director, gave a short talk on the loss of the 2 Mhz from the 220 Mhz band and the Boulder tower case. Both will be appealed.

The next Board Meeting will be held at the Picnic.

Prizes - Keith NYØT

Winners were:

KBØCVT	Chuck	ARRL Op Manual
KABROZ	Jody	Magnet Tool
NØISV	Wayne	Antenna Book
K9ISM	Leslie	Dipole Center Piece
NKØP	Ron	Mystery Prize
NØCMW	Al	Advanced Manual

Program

Chris Smith NKØE put on a program concerning Micro Wave weapons and their effect on electronic equipment. He also discussed how one could protect their equipment. It was an excellent presentation and our thanks to Chris.

The meeting was adjourned at 2130.

The next meeting will be 14 Sept 88

Minutes of the Aug Board Meeting

submitted by Al NØCMW

Aug Board Meeting was held during the Club Picnic at the Air Academy Picnic Grounds. Present were Ron NKØP, Bud NØDDF, Nick KØ5N, Bdale N3EUA, Al NØCMW and Max KDØEL.

A query was received from a previous years member who wanted to submit his dues. He questioned that if he were re-appearing in the middle of the year, would he have to paid the full cost of \$12.00. The Board decided that the member would have to pay the full membership costs.

A call is made to all members to submit nominees for the Club elections in October. If anyone is interested please give your name to a Board member.

The Board would like to thank Jim WA9ABB for organizing the Club Picnic and for doing an excellent job. They also want to thank the two cooks, Don KEØWC and his XYL, Mary.

AIR FORCE ACADEMY RADIO CLUB

The Club had it's regularly scheduled meeting at Arnold Hall on Aug 09. Discussions were conducted as to where the AFA Club station should be located. The next meeting will be held on 13 Sep 88 at 1130 hrs in the same location. The Club will host the PPRAA for its picnic on 28 Aug 1988. Any civilian ham employees or active or retired military are invited to join the Club. Submitted by Al NØCMW.

Phase 3C Operating Frequencies

These are the operating frequencies for the new Oscar-13 satellite which was launched aboard the the new Ariane 4 rocket. The satellite is now in operation and signal levels have been excellent on Mode B and Mode L.

Mode B

Uplink: 435.420 - 435.570 MHz
Downlink: 145.975 - 145.825 MHz
GB: 145.812 MHz
EB: 145.985 MHz

Mode JL:

L Uplink: 1269.620 - 1269.330 MHz
J Uplink: 144.425 - 144.475 MHz
RUDAK up: 1269.710 MHz
L Downlink: 435.715 - 436.005 MHz
J Downlink: 435.990 - 435.940 MHz
RUDAK down: 435.677 MHz
GB: 435.651 MHz

Mode S:

Uplink: 435.601 - 435.637 MHz
Downlink: 2400.711 - 2400.747 MHz
Beacon: 2400.325 MHz

MILEY'S RADIO

Jess KØTAA 719 W. 7th St. Florence, Colorado 81226 (719) 784-3040
Hours 9 to 6 Tuesday through Friday — Saturdays 9 to 1 — Evening Hours 7:30 to 10 Tues., Wed., Thurs. (Call Ahead)
Closed Saturday 1 PM, Sunday & Monday
Closed except by phone appointment Nov. 7—Dec. 12
for first vacation in seven years.

Will get your phone messages by remote and call you
that evening or next morning. Please leave both
day and evening phone numbers on our machine.

If you're looking for a certain rig — put a message
on our machine and we'll try to find it for you.

In stock all the new equipment plus lots of
used equipment — please call.

Used Rigs:

Hamfest Schedule for 1988 as of August 1:

September 24 Sat. Only Santa Fe, NM
National Guard Armory
October 9 Lubbock, TX
October 21, 22, 23 El Paso, TX
Nov. 4, 5, 6 Odessa, TX

End of '88 Hamfest Schedule

Kenwood TS520 80-10M \$400.
Kenwood TS820S 160-10M \$495.
Yaesu 101ZD 160-10M Digital \$495.
Yaesu FV 901DM Scanning VFO w/Memory for 901/101ZD \$275.
Yaesu YO100 Scope \$150.
Yaesu SP901 Speaker \$35.
Yaesu FR101 Matching Recvr for 101 series \$275.
Yaesu FT101B \$375.
Drake C4 Console w/Remote Ant. Switch - Call
Cushcraft R3 Vertical 10, 15, 20 meter w/control \$150.

73's — Jess

9/88

Membership Application

PIKES PEAK RADIO AMATEUR ASSOCIATION, INC.

P.O. Box 16521
Colorado Springs, CO 80935

Name _____

Address _____

City _____ State _____ Zip _____

Call _____ License Class _____

Are You An ARRL Member? ☐ Yes ☐ No Telephone _____

☐ Full Member \$12.00 ☐ Family Membership \$15.00 ☐ Newsletter Only \$4.00
☐ Age 65 or older, or under 18 \$8.00

Additional Names _____ Call _____ Class _____

Associate Member \$8.00 ☐ (Outside Teller & El Paso Counties.)